Publication DD257379A (hereinafter Bergmann), U.S. Patent 2,649,363 (hereinafter Swezey) and U.S. Patent 3,865,936 (hereinafter Lewis).

The present invention, as embodied in claim 1, concerns a method for reducing pests in soil, said method comprising applying to said soil a pest reducing effective amount of a compound selected from the group consisting of iodoacetic acid, bromoacetic acid, 2-iodoacetamide, 2-bromoacetamide, and mixtures thereof; wherein said applying is pre-bedding, pre-transplant, pre-seed, or pre-plant, and wherein said method fumigates said soil. Claim 10 states that the weeds are selected from the group consisting of *Amaranthus hybridus*, *Echinocloa crus-galli*, *Cyperus rotundus*, and mixtures thereof. Due to the election of species, the compound is bromoacetic acid and the pests are weeds (i.e., *Cyperus rotundus*).

The primary reference Bergmann discloses a synergistic herbicide containing a **combination of** 3,5-dibromo-4-hydroxy benzonitrile (Compound I) or 3,5-diiodo-4-hydroxy benzonitrile (Compound II) **and** (A) monochloroacetic acid (Compound III) or monoiodoacetic acid (Compound IV). The object of Bergmann was the desiccation of a crop plant (i.e., potato haulm (stems)) and reduction of tuber infection caused by the fungus *Phytophthora infestans*.

The Examiner has admitted the following (page 4, Office Action): "...Bergmann et al. do not teach the haloacetic acid composition to comprise bromoacetic acid, as instantly claimed..."

Swezey discloses the regulation of the growth of undesired vegetation (e.g., sedge) by contacting the leaf surfaces of plants with monohaloacetic acid (e.g., bromoacetic acid).

Lewis discloses the following (column 1, lines 14-31):

> ...Many of the thousands of organisms that inhabit the soil subsist on living plants. Some injure the roots and other underground parts of the plants and interfere seriously with growth. This problem has been controlled to a certain extent by crop rotation; however, the use of volatile chemicals which function as soil fumigants have become quite common and have been used extensively for the last 30 or more years. Thousands of acres are fumigated annually and the acreage is increasing. Soil fumigation is costly but the increased yield afterwards may have a value very much more than the investment.
> Undesirable living things such as bacteria, fungi, nematodes and insects, as well as certain weeds, have been adequately checked by soil fumigation. Of the fumigants in general use, methyl bromide, ethylene dibromide, and 1,2-dibromo- 3-chloro propane have been used extensively....

The Examiner has alleged the following (page 6, Office Action; emphasis added):

> ...it would have been obvious...to substitute monobromoacetic acid for monochloroacetic acid or monoiodoacetic acid in the compositions of Bergmann et al. because Swezey teaches that monobromoacetic acid, monochloroacetic acid and monoiodoacetic acid are useful phytotoxic compounds useful for controlling the growth of undesired plants. One of ordinary skill in the art would have an expectation of success in substituting monobromoacetic acid for monochloroacetic acid or monoiodoacetic acid in the compositions of Bergmann et al. because they are structurally similar compounds that are interchangeable and would be expected to have similar herbicidal effects on plants.

However, **as pointed out previously**:

It is common knowledge in the field of pesticide/herbicide chemistry that no two compounds, regardless of structure similarity, can be expected to have any or similar efficacy. Highly relevant to this fact is U.S. Patent 6,465,527 (copy previously submitted). Based on the Examiner's allegation above, it would be argued that one of ordinary skill in the art at the time the instant application was filed would have had a reasonable expectation of success in substituting 1,2-diiodoethane in place of 1,2-dibromoethane because 1,2-diiodoethane would reasonably be expected to possess similar physicochemical properties to those of 1,2-dibromoethane due to their substantial structural similarities. However, **in fact**, Table 1 showed that 1,2-dibromoethane was very effective after one hour exposure against the German and American cockroach whereas 1,2-diiodoethane was **not** effective. In addition, Table 2 showed that 1,2-dibromoethane was very effective after 24 hours exposure against the German cockroach whereas 1,2-diiodoethane was **not** effective. This utterly destroys the Examiner's basis for rejecting the claims.

Similar information is provided by the second paragraph under "Results" in the previously submitted article "Leaf Abscission Induced by The Iodide Ion" (Herrett, R.A., et al., Plant Physiology, 3: 358-363 (1961)). Compounds with different halogens were compared as plant defoliants. In table II (page 2), KI is compared to KBr, KCl, and KF. KI had 90% efficacy as a plant defoliant whereas KBr, KCl, and KF demonstrated 0% efficacy, and Herrett stated the following (page 359, right column): "...Only the iodide ion induced defoliation (table II)...." Yet more evidence that similar halogenated compounds do **not** possess similar properties is found in

Table 1 of the previously submitted article "Monofluoroacetic Acid And Related Compounds" (Maynard Chenoweth, Pharmacol. Rev., 1: 383-424 (1949)). Again, this utterly destroys the Examiner's allegation that similar halogenated compounds would reasonably be expected to possess similar physicochemical properties due to their substantial structural similarities.

Furthermore, entries for bromoacetic acid, chloroacetic acid, iodoacetic acid, and fluoroacetic acid from The Merck Index (previously submitted) describes only chloroacetic acid having a known use (i.e., as a herbicide; the sodium salt of fluoroacetic acid was known to be used as a rodenticide). This information regarding chloroacetic acid is also supported by the information (previously submitted) taken from the website http://www.chemicalland21.com/industrialchem/organic/CHLOROACETIC%20ACID.htm and from the website http://www.weblakes.com/toxic/CHLOROACETIC_ACID.HTML which stated the following (emphasis added):

> CHLOROACETIC ACID
> ...Uses
> * Chloroacetic acid is used in the manufacture of cellulose ethers (used mainly for drilling muds, detergents, food, and pharmaceuticals), as a **post-emergence contact herbicide and defoliant**, and in the manufacture of glycine and thioglycolic acid. (2,8)
> * Chloroacetic acid is also used in the manufacture of various dyes, synthetic caffeine, and organic chemicals.

Information (previously submitted) regarding applications of bromoacetic acid taken from the website http://www.chemicalland21.com/industrialchem/organic/BROMOACETIC%20ACID.htm states the application (use) for bromoacetic acid as "...a chemical intermediate for the manufacturing [of] other compounds and pharmaceuticals." Thus the prior art provides no basis for the allegation that bromoacetic acid would reasonably be expected to possess similar physicochemical properties to those of chloroacetic acid due to their substantial structural similarities.

Also highly relevant to the rejection of the claims is the fact that Bergmann stated the following (page 2 of translation, emphasis added):

> ...The object [of his invention] consists in finding advantageous combinations of **known** herbicide active ingredients for use in modern agrotechnical processes that do not cause damage to the succeeding cultures and reduce the infestation of potato tubers with Phytophthora infestans....

Bergmann then cites only two members of the monohaloacetic acid family, chloroacetic acid and iodoacetic acid, for a good reason: Bergmann specifically stated in his abstract that he only wanted to include "**known** herbicide active ingredients" in his "advantageous combinations." This specifically indicates that there were only **two** members in the monohaloacetic acid family that were considered "**known** herbicide active ingredients" at the time of Bergmann's invention since Bergmann specifically omits the other three members of the monohaloacetic acid family (i.e., bromoacetic acid, fluoroacetic acid, and astatoacetic acid). Obviously Bergmann was well skilled in the art and would have listed the members of the monohaloacetic acid family that he considered to be "**known** herbicide active ingredients" and pertinent to his objectives. Note that Bergmann was filed in October 1983, well **after** the publication dates of **all** the references utilized by the Examiner in this Office Action: Swezey, Lewis, Hitchcock, and Watanabe.

Thus Bergmann actually taught only interchangeability among **two** monohalogenated acetic acids (i.e., chloroacetic acid and iodoacetic acid) because those were the only two monohalogenated acetic acids that were disclosed by Bergmann as being "**known** herbicide active ingredients." Bergmann also did not specifically teach using either chloroacetic acid or iodoacetic acid alone so one cannot assume that even the activity of either chloroacetic acid or iodoacetic acid, when used alone, would have interchangeability because one does not know the pure relative contribution of either to the efficacy against weeds in general (much less against *Cyperus* tubers). It should also be noted that Bergmann's **only** reference to the prior art in regard to monohalogenated acetic acids was the citation of U.S. Patent 2,622,976 (Hitchcock) which only teaches only the use of monochloroacetic acid.

Nor does Bergmann teach or demonstrate their efficacy, as a mixture or alone, against weeds (especially *Cyperus*) since Bergmann demonstrated the use of his composition on **food crops** (i.e., potatoes and tomatoes). Therefore, one cannot assume that either chloroacetic acid or iodoacetic acid alone (or any other monohaloacetic acid alone for that matter) would be effective against weeds (especially *Cyperus*).

The Examiner has alleged the following (page 6, Office Action):

> ...It would also have been prima facie obvious...to control the growth of weeds with the compositions of Bergmann et al. with monobromoacetic acid substituted for monochloroacetic acid or monoiodoacetic acid because Swezey teaches that monochloroacetic acid, monobromoacetic acid and monoiodoacetic acid are suitable for controlling the growth of several varieties of weeds....

As previously pointed out, the fact remains that Swezey is silent regarding the application of the active compound to soil when the applying is pre-bedding, pre-transplant, pre-seed, or pre-plant. In every example of Swezey the compound is applied to **leaves** of plants in various stages of **post**-emergent development; there is not a single reference to a soil application pre-bedding, pre-transplant, pre-seed, or pre-plant. Column 1, line 46 through column 2, line 5 shows that the compound is applied to leaves of plants in various stages of post-emergent development (i.e., not pre-bedding, pre-transplant, pre-seed, or pre-plant). In Swezey if there are no plants then there would be no spraying. There is also not a single mention of activity against seeds, tubers or other propagules **in** the soil as opposed to **above** the soil.

As previously noted, Lewis states that "...Soil fumigation is costly but the increased yield afterwards **may** have a value very much more than the investment...." The Examiner has provided no basis whatsoever that secondary incidental application of spray to soil (after the primary foliar application to plants) would be expected to result in a pest reducing effective amount in the soil; this is especially relevant to claims 13 and 22. In addition, the Examiner has provided no basis whatsoever that the effectiveness of foliar application of active compounds to plants would be expected to also result in effectiveness with soil. Foliar application to plants results in the direct interaction between plants and the active compound. However, the Examiner has not shown that active compounds when applied to soil would retain their activity since the

compound could interact with the soil or be fully or partially broken down by microorganisms in the soil. It is well know that foliar active herbicides are **not** necessarily soil active (http://www.aces.edu/pubs/docs/A/ANR-0629/); for example, foliar active herbicides clethodim, diquat, fluazifop, glufosinate, glyphosate, pelargonic acid and sethoxydim are known to have no soil activity (http://ag.arizona.edu/urbanipm/weeds/desertweeds.html). It is also well known that glyphosates (e.g., Roundup™) bind tightly to soil colloids, and this is the reason why they have no soil activity and that even dust can reduce the effectiveness of glyphosates (http://www.weeds.iastate.edu/mgmt/2006/dust.shtml).

Withdrawal of the rejection of the claims under 35 U.S.C. Section 103(a) is respectfully requested in view of the above.

Claim 23 has been rejected as purportedly being obvious in view of the combination of Bergmann, Swezey and Lewis, and further in view of Watanabe et al. (hereinafter Watanabe). That rejection is respectfully traversed.

Claim 23 states that the weeds are tubers of *Cyperus rotundus*.

Bergmann, Swezey and Lewis have been discussed above.

Watanabe discloses a synergistic herbicidal composition for combating the undesired vegetation of perennial weeds of Cyperaceae (*Cyprus* spp. (sedges)) and Gramineae. The composition contains as active ingredients at least one of the herbicidal compounds having contact acute phytotoxicity (compound A) **and** at least one of the herbicidal compounds having translocated chronic phytotoxicity (compound B). Compound A is described at column 1, lines 53-66 and includes chlorinated aliphatic acids (e.g., monochloroacetic acid). Compound B is a fluoropropionic acid.

The Examiner has alleged the following (page 9, Office Action):

> ...it would also have been prima facie obvious...to fumigate the soil with the compositions of Bergmann et al. with monobromoacetic acid substituted for monochloroacetic acid or monoiodoacetic acid in order to control the growth of *Cyperus rotundus* because Watanabe et al. teach that monochloroacetic acid is suitable for controlling weeds of *Cyperaceae*....

As previously pointed out, it is common knowledge in the field of pesticide/herbicide chemistry that a compound cannot be expected to have any or similar efficacy against *Cyperus* species even if it works on other plant species. This is shown by Hitchcock's (U.S. Patent 2,622,976) own varying efficacy data on different weeds in Table 1 which shows that not all weeds were equally susceptible to a common herbicide. Neither Hitchcock or Bergmann listed or demonstrated any activity of chloroacetic acid against *Cyperus* or *Cyperus* tubers, and Watanabe only demonstrated a mixture (compound A **and** compound B) and not chloroacetic acid alone against *Cyperus* plants. *Cyperus* has underground tubers which many herbicides will not kill even though they work on other weeds; for example, diuron has activity against broadleaf weeds and grasses yet still does not affect nutsedge (see previously submitted copy of Weed Susceptibility Chart, Agamalian, H., Bell, et al., 2006; available at http://wric.ucdavis.edu/information/weedchart.html). Furthermore, it is well known in the art that no two chemicals, much less a family of chemicals, regardless of structural similarity, can be expected to have the same life-time in the soil, or have the same plant uptake in the xylem or root system of all weeds, or have the same solubility in water.

In view of the above, withdrawal of the rejection of the claim under 35 U.S.C. Section 103(a) is respectfully requested in view of the above.

Claims 1, 2, 9, 10, 13, 15, 20-22 and 24 have been under 35 U.S.C. Section 103(a) as purportedly being obvious in view of the combination of Hitchcock (U.S. Patent 2,622,976) in view of Swezey and Lewis.

The present invention has been fully described above.

The primary reference Hitchcock discloses a method of controlling the growth of weeds through the pre-emergence treatment of soil with an aqueous solution of chloroacetic acid in an amount of 20 to 40 pounds of chloroacetic acid per acre.

The present invention differs from Hitchcock in that the present invention utilizes bromoacetic acid (as elected) whereas Hitchcock utilizes chloroacetic acid.

The deficiencies of Hitchcock have been described above. The deficiencies of Swezey and Lewis have been fully described above. Their combination with Hitchcock does not cure those deficiencies.

Hitchcock teaches the use of chloroacetic acid (not monohaloacetic acids as a family) only for certain specific weeds (Table 1), and even then the weeds were susceptible at varying concentrations of chloroacetic acid. Hitchcock does not teach or demonstrate the use of chloroacetic acid against *Cyperus* or *Cyperus* tubers which are much harder to kill than the common garden variety weeds listed in Hitchcock's Table 1 (see also previously submitted copy of Weed Susceptibility Chart from UC Davis). One cannot assume that the other members of the monohaloacetic acid family would perform well against a weed tuber (*Cyperus*) when even chloroacetic acid was not used against it.

The Examiner's allegation that one of ordinary skill in the art would have a reasonable expectation of success if bromoacetic acid were interchanged with chloroacetic acid is false as shown above. Furthermore, the Examiner is basing his assumption on the positive results and the material that he took from studying the present patent application and thus is putting forth an assumption based on hindsight which is strictly prohibited (*Grain Processing v. American Maize*, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988)). One has to find a reasonable expectation for the success of bromoacetic acid, alone, especially against *Cyperus* tubers, without using the present application. Three references utilized by the Examiner in this Office Action (Bergmann, Hitchcock, and Watanabe) would definitely be considered to have at least ordinary skill in the art, yet the fact remains that not one of the three listed or demonstrated bromoacetic acid, fluoroacetic acid, or astatoacetic acid (all members of the monohaloacetic acid family) as a herbicide. Nor did any of the three chose to list or demonstrate the use of bromoacetic acid on *Cyperus* or *Cyperus* tubers, especially at the rate of 40-1200 (or 100-400) pounds per acre. Instead all three references chose to use the "**known** herbicide active ingredient" chloroacetic acid. One has to ask the following question: why did the prior art not refer to bromoacetic acid, fluoroacetic acid, or astatoacetic acid if these compounds were "**known** herbicide active ingredients"? If there was a reasonable expectation of success, as alleged by the Examiner, would not at least one of the three (Bergmann, Hitchcock, or Watanabe) have listed bromoacetic acid given that it is said by the Examiner to be obvious to one with ordinary skill in the art? Applicants note that the Examiner still has not answered this question.

Withdrawal of the rejection of the claims under 35 U.S.C. Section 103(a) is respectfully requested in view of the above.

Claim 23 has been rejected as purportedly being obvious in view of the combination of Hitchcock in view of Swezey and Lewis, and further in view of Watanabe. That rejection is respectfully traversed.

All of the arguments above pertaining to Hitchcock, Swezey, Lewis, and Watanabe are fully applicable here.

Withdrawal of the rejection of the claim under 35 U.S.C. Section 103(a) is respectfully requested in view of the above.

In view of the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

Please charge any required fees pertaining to this Amendment to the Deposit Account of the undersigned, No. 50-2134, and credit any overpayment to said Account.

Respectfully submitted,

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